ABSTRACT FOR PAPER

FAULT PROTECTION DESIGN OF THE QUIKSCAT AND SEAWINDS INSTRUMENTS

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The QuikScat and SeaWinds instruments are radar scatterometer instruments that will be used to measure ocean surface winds. The QuikScat instrument will be launched on a dedicated spacecraft in November 1998, and the SeaWinds instrument will be launched on the Japanese ADEOS-II spacecraft in the summer of 2000.

The QuikScat/SeaWinds instrument is designed to continuously operate in a science collection or wind observation mode for nearly the entire three year mission. However a number of fault and external conditions can occur that will interrupt the smooth and continuous wind observations of the instrument. These types of faults include the failures in the radar unit's TWTA, communication errors with the spacecraft, communication errors between the instrument's three subsystems, software errors in the computer subsystem, and possible effects of cosmic ray and solar flare induced single event upsets in the instrument computer.

In general, the philosophy of the instrument's autonomous fault response will be to perform different levels of resets in order to clear a fault that is causing a particular type of problem. In general, the instrument will attempt to recover from the fault in a manner that will allow the instrument to resume normal operations without ground intervention. However, if the fault does not clear with a reasonable level of effort by the autonomous algorithms in the instrument, the instrument will place itself into a safe standby mode and wait for ground interaction. In no case, will the instrument attempt to recover from faults by switching redundant units. The switching of redundant units is to only be performed under command and control from the ground.

This paper will provide a description of the fault protection mechanisms that are built into the instrument, and will describe how these mechanisms will react and escalate their response when a fault is not cleared by the initial response to the fault. Also, this paper will describe the fault protection mechanisms that have been designed into the spacecraft, in order to react to certain faults and failures in the instrument. Also, there will be a description of the actions that the spacecraft will take on the instrument in the case of a spacecraft failure that will require the shutdown of the QuikScat/SeaWinds instrument.